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ABSTRACT

The structure of incentives and disincentives for student effort in school, and how this structure may be modified by educational reform, were investigated using data from the High School and Beyond (HS&B) survey. A framework was designed which blends sociologists' focus on school organization and educational stratification with economists' explicit attention to individual response to incentive structures. Independent variables such as homework time, misbehavior, and difficulty of courses were found to exert a significant effect on course grade response. However, the magnitude of these effects are slight, and this suggests that stronger incentives for homework time and good behavior may be desirable. Minority, low socioeconomic status, and non-academic track youths do not receive lower rewards for good behavior; and minorities and non-academic track youth suffer weaker penalties in terms of negative grading effects for attempting more difficult courses. Yet the variables examined in the study are unable to account for the generally lower grade point averages earned by these students. The extent to which such inter-group differences are due to ascription, ability, or motivation remains a research question. A 37-item reference list is appended. (Author/KH)

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INCENTIVES AND DISINCENTIVES FOR SUBJECT MATTER DIFFICULTY AND STUDENT EFFORT: COURSE GRADE DETERMINANTS ACROSS THE STRATIFICATION SYSTEM

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INCENTIVES AND DISINCENTIVES FOR SUBJECT MATTER DIFFICULTY AND STUDENT EFFORT: COURSE GRADE DETERMINANTS ACROSS THE STRATIFICATION SYSTEM

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FOREWORD

This paper is a product of the nonresident scholar program conducted by the Research Division of the National Center for Research in Vocational Education. This program is designed to draw on scholars from outside the National Center in order to assure a broad coverage of research topics and spark a lively exchange of ideas among top scholars in the country.

Thanks are due to the authors of this paper, George Farkas, Associate Profesor in the School of Social Science, University of Texas at Dallas and to Lawrence Hotchkiss, Research Specialist, the National Center for Research in Vocational Education. Additionally, appreciation is expressed to Lawrence Hotchkiss and to John Bishop, Associate Director of the Research Division at the National Center for coordination of the nonresident scholar program.

ABSTRACT

This paper offers a framework blending sociologists' focus on school organization and educational stratification with economists' explicit attention to individual response to incentive structures. The course grade response to student homework time, misbehavior, and difficulty of courses attempted is estimated via fixed effects applied to two waves of a large national sample. We ask whether minority, low SES, and/or non-academic track youths receive weaker incentives for school effort.

Each of the independent variables is found to exert a significant effect in the expected direction. However, these effects are small in magnitude; stronger incentives for homework time and good behavior may be desirable. Minority, low SES, and non-academic track youths do not receive lower rewards for such good behavior, and minorities and non-academic track youths suffer weaker penalties for attempting more difficult courses. Yet, the variables examined here are unable to account for the generally lower grade point averages earned by these students. The extent to which such inter-group differences are due to ascription, ability, or motivation remains a research question.

When the Texas Educational Reform Act of 1984 was implemented, newspaper stories throughout the state reported the consequences of more rigorous educational standards -- students beginning to try harder in school, some reluctance to sign up for more difficult courses, increased course failures, some (highly publicized) high school athletes disqualified from participation in sports, but many more passing all courses, often as a consequence of increased effort and tutoring, and generally improved teacher and administrator morale. This multiplicity of responses highlights the role of schools as structured incentive systems, with course grades the immediate reward for effort. As in any such system, participants must choose actions along several dimensions simultaneously, and confront the tradeoffs involved. In particular, the student (perhaps in interaction with his parents or school counsellor) must decide whether or not to enroll in the academic curriculum track, the difficulty level of courses to be attempted, an implicit level of school attachment or intensity of school effort operationalized by such things as absences or lateness and levels of disruptive behavior, and an explicit level of course effort in terms of hours spent on homework.

The school can affect these decisions by the benefits and costs it attaches to them, and study of the schooling incentive system is significant for at least two reasons. First, this system has broad societal implications since youth schooling decisions and performance are closely related to occupational career decisions and outcomes, and thus constitute the

microfoundations of stratification outcomes. And second, as shown by research on tax structures, welfare reform, and subsidized employment, among other policy areas, incentive systems typically involve unintended as well as intended consequences. Thus, anyone interested in schooling effectiveness and its improvement must also be interested in the structure of incentives and disincentives for student effort in school, and how this structure may be modified by educational reform.

The present study directly addresses the course grade benefits and costs of student time spent on homework, student "attitude" or intensity of effort, and the difficulty level of the subject matter the student chooses to attempt. The relationship between each of these student choices and his course grade outcomes is estimated separately across the full combination of academic/nonacademic curriculum, low/high SES background, and white/minority (black or Hispanic) racial background. The goal is to contribute to a synthesis of sociologist's studies of curriculum tracking and school opportunity structures (Heyns, 1974; Alexander and McDill, 1976; Rosenbaum, 1978; Alexander, Cook and McDill, 1978; Alexander and Cook, 1982), and economist's and sociologist' studies of educational production and resource allocations within schools (Murnane, 1975; Brown and Saks, 1975; Wiley, 1976; Levin, 1976a, b; Harnischfeger and Wiley, 1976; Hanushek, 1979; Brown and Saks, 1980; Hanushek, 1981).

FRAMEWORK

The framework we seek blends sociologists' focus on school organization and opportunity structures with economists' explicit attention to individual response to incentive structures. We discuss each of these in turn.

Curriculum Tracking and School Opportunity Structures

Drawing from and building on a diverse literature including Hollingshead (1949), Turner (1960), Sorenson (1970), Schafer and Olexa (1971), Rist (1973), and Heyns (1974), Rosenbaum (1975, 1976, 1978) reported case study findings that curriculum tracking significantly restricts student opportunity. A key feature of his argument concerns the determinants of two variables which themselves help to determine later educational and occupational achievement: course grades and class rank. (For corroboration of the significant effect of grades on later achievement, see Jencks et al., 1983.)

Rosenbaum finds that non-college track students typically have lower grade point averages than college track students, a result he interprets to mean that "teachers have already adjusted for the easier requirements they apply in non-college tracks when they give out grades." (1978: 245) Further, class rank is then computed by weighting student averages so that, for example, "the grade of D in the upper-college track has the same value as an A in the lower-general track." The relative leftward shift of the

non-college track grading curve, combined with the weighting downward of these students' grade point averages in the computation of class rank, guarantees that their rank in class will fall below that of all college track members.

Alexander, Cook and McDill (1978) and Alexander and Cook (1982) join this argument by distinguishing between the gross and net effects of curriculum track placement. Employing regression analysis on a larger, multi-school data set, they show that with sufficient controls for predetermined variables, the net effect of academic track membership on senior year grade point average and rank in class (among other variables) can be driven very close to zero. (For grade point average, see the bottom row of Table 3 in the 1982 paper; for rank in class see Table 4 in the 1978 paper.)

The perspective we propose builds on the regressions in which Alexander and Cook (1982) employ a variety of predetermined variables to predict senior year grade point average (see the bottom row of Table 3 in their paper). Among these are the time the youth spends on homework, and the difficulty level of the coursework he undertakes. The former variable is shown to positively affect grades, and the latter to negatively affect them. Other significant variables in the regression include lagged grades and standardized ability and achievement test scores.

The innovation we propose is to single out the effects of those student actions -- subject matter difficulty undertaken and effort level applied -- which are directly under the youth's control, and examine the rewards (as measured by course grades)

these actions call forth, separately across race, SES background, and curriculum track combinations. Formally (and for the moment excluding measurement and estimation issues to be addressed below) we are merely adding interaction terms to Alexander and Cook's regressions. Yet this permits a somewhat expanded perspective which can be very useful for the study of educational stratification.

To begin with, largely as a consequence of residential segregation, youths of different race and social class generally attend school separately. In addition, within the same school peer group sorting and curriculum tracking further separate students, with higher SES students likely to be found among youths from similar backgrounds within the academic track. (For reports of this gross effect of SES on track placement see Alexander and McDill (1976) and Alexander, Cook, and McDill (1978). These studies provide a better estimate of this effect than Rosenbaum's (1976) negative finding from a single white, working class community.) Thus, for example, high SES white youths in the academic track tend to spend their high school years together, each individual choosing his own courses and effort level, attaining a certain mastery of the subject, and receiving a certain grade for his efforts. If we define race as white/minority, SES background as high/low, and curriculutm track as academic/non-academic, then a student in one of the resulting eight "school social worlds" has his own effort level as primary decision variable, and the resulting course grades as primary "payoff function." (For the moment we abstract from other,

longer term payoffs such as college admissions.) The issue then becomes: to what extent do individual "human capital production functions" (see below), combined with high school grading practices, reward or punish student choice of effort level and coursework difficulty, and to what extent does the resulting incentive structure differ across the student groupings described. In particular, are non-academic track students, and/or low SES or minority students, systematically discouraged from investing in schooling due to the low rewards for such effort?

Approaching the issues of educational stratification in this way permits a dual focus: first, on the student's decision problem regarding his own effort in school in light of his abilities and goals, and the social milieu that helps shape them, and second, on school and teacher policies -- for example, grading curves across courses -- which may provide differential incentive structures for youths defined by race, social class, or curriculum track. This perspective also lends itself to integration with the work of economists who have studied education, a literature to which we now turn.

Educational Production Functions and School Incentive Structures

For some years now, economists have been bringing their perspective to bear on learning and schools. The resulting literature on "educational production functions" includes

Hanushek (1971, 1972), Murnane (1975), Brown and Saks (1975), and Levin (1976a, b), as well as related work by the sociologists Wiley (1976) and Harnischfeger and Wiley (1976); for useful reviews see Hanushek (1979, 1981) and Brown and Saks (1980). Our point of departure is the latter article, particularly the section on "incentive structures and student allocations of effort" (pp. 100 -112).

Brown and Saks note that student learning results from ability combined with allocation of effort; the latter defined both in terms of the time spent on particular activities and the intensity of work performed in that time. A kind of informal market behavior exists, with teachers and students negotiating over the students' time and effort levels. Central to this negotiation is the incentive system defined by the teacher's grading practices. This incentive system -- the "schedule" of grades assigned to varying levels of student performance and effort -- constitutes the "demand side" of the market for these goods. (Brown and Saks concentrate on grades as important short-run rewards, abstracting from longer-run rewards such as college attendance.)

In their model of schooling behavior, Brown and Saks go further than many previous economists in introducing realism along at least two dimensions; school organizational structure (student segmentation into classrooms and ability groups) and the significance of the choice of intensity (pace) of learning and effort (distinguished from the sheer number of hours involved). Thus, the authors spend the greatest part of their text improving

upon previous formulations by extending the economic theory to account for student groups or tracks -- this leads to issues of "multiple outputs and inputs with inseperable production relations across students" (pp. 54-55). They also carefully distinguish between movement along a learning curve (the effect of how much time is spent on an activity) and the slope of the curve (which is determined by the pace or intensity of these efforts). (p. 101) These are the dimensions -- organizational structure and the choice of pace or intensity -- we expand even further in the integrated view we propose.

An Integrated View and the Goals of the Present Study

Both the sociological and economic literatures are compatible with a view of student performance which stresses learning as a function of effort (time and intensity) and ability, with effort being a short-run choice variable at least partially under the student's control. (For the moment we abstract from limitations on choice induced by the family, neighborhood, and/or peer group environment. The latter are at least partially subsumed under the SES/race/curriculum-track groupings re-introduced below.) The allocation of this effort is then at least partially the result of the student's response to the incentive system (in particular, the teacher grading practices) he faces.

The nature of this system, and its possible variation across distinct "within-school social worlds" then becomes an important

empirical question. Brown and Saks explore certain economic theoretical questions on this score, but only sociologists such as those cited above have begun to empirically describe and explore the consequence of student segregation by curriculum-track, and the relationship of this practice to the stratification system generally. Providing empirical work which melds these disparate research traditions is one of the goals of the present study.

A key issue -- and the one we empirically address -- concerns the incentives for effort provided to different groups of students by the course grading system. That is, does the grading system in fact provide consistent positive incentives for academic effort, and are non-academic track students and/or those from family backgrounds which place them at the bottom of the stratification system -- low SES and minority youths -- confronted with systematically lower payoffs? Further, how do these incentives vary across the three actions under the youth's immediate control -- time spent, intensity of effort, and difficulty of the subject matter attempted? Here we take a hint from Alexander and Cook and add the last-named variable to Brown and Saks' description of the crucial choices available to students.

It would, of course, be desirable to estimate true "structural equations" for behavior within each student grouping. There would be a production relationship for student learning (on an absolute scale), measured as a function of the work attempted, student ability and time and intensity of effort, as

well as characteristics of the school and home environment. Next, there would be an equation stating the determination of these effort variables as a function of the incentive system (grades and other rewards) and "tastes," with the latter explicitly including the roles of family, neighborhood, peer group, and teacher or counsellor, the influence of these mediated by variables such as aspirations and expectations. Finally, there is the grading relationship itself, with course grades determined by the amount the student learned, as well (possibly) as other variables such as school practices and teacher tastes (including prejudices, special credit for students who "try hard" or show good deportment, as well as other attitudes and beliefs).

In practice, we are unable to separate these equations since we lack an absolute scale measure of student learning. However, we can estimate the reduced form of course grades against student inputs, and although this fails to separate student performance from the relative grading system applied to different students, it does provide a bottom line answer to a key question: What incentives are provided for student academic effort across the social class system? Further, by employing a statistical methodology which exploits two waves of data to use students "as their own control," we are able to net out correlated and difficult-to-measure variables such as student ability, and thus go further than previous investigators in providing unbiased estimates of incentive-for-effort effects. It is to these and related issues that we now turn.

METHODOLOGY

Data

We analyze the initial and first follow-up data from the High School and Beyond (HS&B) survey. Thus, we focus on data for those public or Catholic high school sophomores who were interviewed in 1980 and again in 1982. Since these data have been widely discussed as a consequence of the "new Coleman Report" (see Coleman, Hoffer, and Kilgore (1982), and the two special issues of the Sociology of Education, April, 1982, and April, 1985), we will not describe them further here. For further description see the sources cited above. Additional sources include Frankel et al. (1981), Jones et al (1983), Hotchkiss (1984), and Alexander, Natriello and Pallas (1985).

Variables

The dependent variable is the student's grade point average (all variables are based on self-reports). As described more fully below, we employ its score at times 1 and 2 (sophomore and senior years in high school), and conduct the analysis on the change over time (difference) in these scores.

The independent variables are time spent on homework (hours per week), a misbehavior index constructed from measures of tardiness to school, absence when not sick, cutting class, misbehavior in the classroom, expulsion from school, and being in

trouble with the law, and an index of the difficulty of the courses the student has undertaken, measured as the number he took from the following list: first year algebra, second year algebra, geometry, trigonometry, calculus, biology, chemistry, physics. The homework and misbehavior variables are measured at times 1 and 2, and their difference scores are used in the regression; the course difficulty variable is measured only at time 2 since student choice, and these particular courses, are available only during the final high school years.

The interpretation of the homework time and course difficulty variables is straightforward; that of the misbehavior index is less so. Our goal is to operationalize Brown and Saks' notion of the intensity of the student's effort to learn the course material (as opposed to the sheer time spent on the task), and another name for our variable might be "attachment to school." However, the information available on our data set most directly measures poor deportment, which may occasion negative teacher sanctions independently of its effect upon the student's mastery of the subject matter. There is little that can be done about this in the absence of direct measures of subject matter mastery; even direct attempts to question the student about his "intensity of schoolwork effort" will confound the direct grading rewards to "good behavior" (even in the absence of learning improvement) with the rewards to the resulting greater mastery. In any event, the reduced form total effect of misbehavior on grades is of interest in itself, since this measures the magnitude of the disincentive for such behavior.

The analysis sample is stratified by race, family SES background, and curriculum track. Race is defined to be white (non-Hispanic caucasian) or minority (Hispanic or black). Family SES background is measured by a multi-variable index including measures of parental education and occupation, income, home ownership, and possessions (see Hotchkiss, 1984), and is divided into two categories at the median. Curriculum track is measured as academic vs. non-academic.

The Model

Previous analyses of the two waves of HS&B data have typically taken the time 2 variables as dependent, with their lagged (time 1) values included as regressors alongside other time 1 predictors of interest (see, for example, Hotchkiss, 1984, and the articles in the April, 1985 issue of the Sociology of Education). However, a competing method of analysis may be advantageous in our situation. This is the first difference method, in which cross-sectional equations are written for each time period, and then differenced to produce the equation which is actually estimated. As discussed by Liker, Augustyniak, and Duncan (1985), this method is ideal for netting out difficult-to-measure variables which may be correlated with the effects of interest. Further, it avoids two difficulties with the cross-lagged regression model -- endogeneity in the lagged dependent variable, and thus the possibility of biased coefficients for the other predictors, and the absence of a clear

causal interpretation for the estimated coefficient of the lagged dependent variable.

In fact, the first difference model is a special case of the "fixed effects" model, which has been widely used by econometricians interested in estimating the effects of vocational education and manpower training programs (examples include Kiefer, 1979; Bassi, 1983; and Olsen and Farkas, forthcoming). Its history goes back to the desire for unbiased estimation of the returns to factors of production in the presence of difficult to measure and correlated "managerial ability" (Hoch, 1962), a use which parallels our interest in the returns to student effort in the presence of difficult to measure and correlated student ability. Finally, as evidenced by Jasso (1985), this method has recently seen increasing use by sociologists, a trend which promises to continue as its useful properties become more widely appreciated.

Application to our situation begins with equation (1), which writes youth i's grade point average at time 1 as a function of his homework time, misbehavior, and course difficulty at that time, as well as a host of other, unchanging or more slowly changing variables such as family background, network ties, and personal attitudes, whose effect is represented by his personal "fixed effect," v_i. There is also a time specific fixed effect, w_1, and, as usual, a random error time, e_{i1}:

$$(1)\quad Grades_{i1} = B_1 + B_2HW_{i1} + B_3Misbeh_{i1} + B_4CrseDiff_{i1} + v_i + w_1 + e_{i1}$$

Next, a similar equation is written for time 2:

$$(2)\quad Grades_{i2} = B_1 + B_2 HW_{i2} + B_3 Misbeh_{i2} + B_4 CrseDiff_{i2} + v_i + w_2 + e_{i2}$$

Finally, subtracting (1) from (2) we arrive at (3), the equation to be estimated:

$$(3)\quad \Delta Grades_i = (w_2 - w_1) + B_2\, \Delta HW_i + B_3 \Delta\, Misbeh_i + B_4\, \Delta CrseDiff_i + (e_{i2} - e_{i1})$$

Several points are of interest here. First, the course difficulty variable figures as a first difference, but is measured only at time 2; it represents "advanced courses" which are not offered at earlier time points. That is, we assume that within the groups stratified on, there is little variation in the time 1 score for this variable. The resulting measurement error in this variable could bias its coefficient downward; thus, the strong effects we find for this variable are conservative.

Second, in differencing equations (1) and (2), the personal fixed effect v_i drops out. That is, unchanging or very slowly changing personal attributes such as family background, underlying attitudes, or academic ability are differenced away; the youth is used "as his own control" by comparing his time 2 behavior to his own behavior at time 1. By comparing youths only to themselves, we avoid the inferential difficulties introduced by powerful unmeasured variables which differ across

individuals. For discussion of the attractiveness of this estimator, see Mundlak (1978), Hausman and Taylor (1981).

Third, the model still fails to account for unmeasured variables which do change over time. To the extent that these are correlated with the variables in equation (3), we continue to face the old problem of potential omitted variable bias. However, the predictor variables in (3) are found to show very low correlations with one another, so that we might presume that their correlations with omitted variables are also low, minimizing the magnitude of bias on that score.

Finally, with powerful predictors such as family background, and individual ability and ambition differenced away, a large portion of the remaining variance is random noise, and previous first-difference calculations such as (3) typically show very low R^2. Since our principal interest is in unbiased estimation of specific effects, as well as comparison of their magnitude across sample subgroups, this should not unduly concern us.

RESULTS

Means

Table 1 shows the distribution of the sample across SES, race, and curriculum track categories. We have 22,336 observations, of whom 36.2 percent are in the academic track. Sample sizes for each of the four SES/race combinations are substantial, varying from a low of 1,848 for high SES minorities to a high of 9,899 for high SES whites. Academic track membership varies across class and race: approximately 26 percent

of low SES youths are enrolled in this track, irrespective of race, whereas 39 percent of high SES minorities and 47 percent of high SES whites are so enrolled.

Table 2 displays the means of the analysis variables. For the grade point average, homework time, and misbehavior index variables we show both their time 1 means and the average of their first differences. We see that each of the stratifying variables is predictive of the youths grade point average at time 1; holding constant the other two variables, higher SES youths have higher scores than lower SES youths, whites have higher scores than minorities, and academic track youths have higher scores than those in non-academic tracks. The largest differences are associated with race and curriculum track; SES differences are considerabily smaller. These gross curriculum track differences are consistent with Rosenbaum's observation that the non-academic track grading curve is shifted leftward.

Average over-time change in this variable is small (typically less than 5 percent of the time 1 mean), and positive for every group. The largest gains are exhibited by the groups with the lowest time 1 means -- low SES, non-academic minorities and whites -- while the smallest gains are shown by the groups with the highest time 1 means -- high SES, academic minorities and whites. However, these differentials are not large, and do not go very far toward equalizing the grade point average differentials across groups. Many forces potentially underly these patterns, including ceiling effects (the highest possible score is 4.0), regression toward the mean, differential school

dropout rates, and teacher "curving" course grades so as to maintain a relatively stable average. Certainly, the overall stylized fact is of great stability in the means, with a slight upward tendency from sophomore to senior year.

The time 1 homework variable (average hours per week) shows differences by SES and curriculum track, but not by race. Most striking are the curriculum track differences; within each SES/race combination, youths in the academic track report homework hours roughly 50-60 percent greater than those reported by non-academic track youths. These means increase for each group over time, but the average change is small and shows no major patterns (although as with the grades variable, there is a tendency for the lowest time 1 scores to show the greatest over time gain).

The misbehavior index was constructed by standardizing each of its component variables to a zero mean and unit standard deviation, and then adding the resulting scores; the result is a variable which takes on negative as well as positive values. Once again, the major division of the time 1 means occurs for the curriculum track comparison; academic track students show much lower misbehavior levels, and this holds for all SES/race combinations. Race is also a factor, although a weaker one, with whites showing lower misbehavior scores than minorities. Misbehavior, like homework, is reported to increase over time, with the greatest increases occurring for the groups with the lowest time 1 means.

Finally, the course difficulty variable (number of courses

taken from the list of eight advanced math and science courses) also shows the expected inter-group differences. The largest is for curriculum track; average academic track scores are approximately 50 percent higher than non-academic scores across all SES/race combinations. We also find a tendency for high SES and/or white students to take more difficult courses, but these effects are smaller and less consistent than those associated with curriculum track.

Regression Results

Table 3 reports the estimates of equation (3). Most striking is the consistency of results. As predicted, time spent on homework increases grades, while misbehavior and course difficulty decrease them. These patterns hold across all groups, and are almost invariably statistically significant. This is strong support for the usefulness of our specification.

The coefficients reported are unstandardized; they directly measure the response of grades to a one unit increase in each of the independent variables. Thus, by reading down the columns of this table we can compare the magnitudes of each of these effects across groups, and test the hypothesis that non-academic track youths, and/or low SES and minority youths, experience weaker incentives for schooling effort.

Reading down the homework and misbehavior columns, there is no consistent support for this proposition. Thus, the strongest effect of each variable occurs for a group not singled out by the

proposition -- high SES, minority youths in the non-academic track. By contrast, the high SES, white youths in the academic track (the "highest" stratification class) and the low SES, minority youths in the non-academic track (the "lowest" stratification class) display coefficients in the middle of the pack. A conservative description of these effects is that they vary randomly across groups.

On the other hand, the course difficulty variables do show a pattern, but it is the opposite of that hypothesized by those who argue that tracking restricts opportunity among lower track youths. That is, we find stronger negative grading effects of course difficulty for academic than for non-academic track youths, and for white than for minority youths. This was not anticipated by previous findings, and raises the question as to why teacher grading practices distinguish between groups when establishing disincentives for taking difficult courses, but not when establishing incentives for homework time or disincentives for misbehavior. One explanation focuses on the role of the grading system in determining usage levels for goods which are "scarce" rather than "free" as viewed from the perspective of school administrators. Advanced courses are scarce; teachers with the requisite training are the most difficult to find (particularly where, as in our variable, advanced math and science courses are at issue), and typically constitute only a small portion of the faculty. Accordingly, students must be found to take the less difficult courses, and the school can accomodate only a limited demand for advanced course offerings. By comparison, student

effort is "free" to the school; if the entire student effort distribution were to shift one standard deviation to the right, there would be few consequences for the allocation of "real" school resources (or for the shape and location of the grading curve).

In addition, advanced courses on the transcript can be an important credential for the college-bound youngster. Thus, the "demand" for such courses ought to be shifted strongly rightward for academic by comparison with non-academic track youths. (Of course this merely reinforces patterns already in effect due to sorting across tracks on the basis of individual tastes and abilities.) In this situation, it is plausible for teachers to "lean against the wind" by grading particularly rigorously in advanced courses offered to groups with a high percentage of college-bound youngsters.

Anyone who has taught and graded where student course demand is a factor must recognize such teacher responsiveness to the strength of student "bargaining position" as a partial determinant of grade setting. Yet inter-group slope differentials for course difficulty are hardly the most striking feature of Table 3; that distinction goes either to the consistency of direction and significance for each of the variables, or to the small magnitude of the resulting coefficients. For by comparison with inter-group differences in the dependent variable means reported in Table 2, these effect estimates are relatively insignificant; that is, a regression decomposition would show that only a tiny percentage of the

grading gap between academic and non-academic track students can be accounted for by group differences in average time spent on homework, misbehavior, or course difficulty.

Here it is useful to recapitulate the properties of our estimation technique. The basic structural model is embodied in the cross-sectional relationships of equations (1) and (2); within any particular group constituting a "school social world," course grades at a point in time depend upon effort undertaken and ability at that time, where ability and other unmeasured variables are captured in the person-specific "fixed effect." The method involves unbiased estimation of the effects of the effort variables as a consequence of differencing away the difficult to measure unobservables embodied in the fixed effects. However, this is just an estimation technique; the resulting coefficient estimates (Table 3) still apply to the cross-sectional variables of equations (1) and (2), as do the effects of ability and the other unmeasured variables embodied in the fixed effects, even though we have not explicitly extracted these.

The method surely provides the best currently available estimates of the net effects of student effort, misbehavior, and course difficulty on student grades. (Once again, the reader is invited to see Bassi (1983), Jasso (1985), Liker et al (1985), or any of the other previously cited fixed effect papers, for discussion of the efficacy of this method in removing the effects of correlated unmeasured variables while avoiding the perils of endogeneity associated with lagged dependent varibles.) The

conclusion is that these effects are small, and of little value in accounting for curriculum track differences in student grades.

Should we conclude that student ability and unmeasured aspects of motivation and effort, rather than ascription, are driving the fixed effects, and that these effects manifest themselves in superior student performance within the academic track, so that these students are simply getting "the grades they deserve" as Alexander and Cook (1982) conclude? Perhaps. But Alexander and Cook employ lagged grade point averages (as recorded in both 9th and 11th grade) to move the curriculum track effect to zero, and such lagged grades would themselves embody any ascriptive curriculum track effects which might be embodied in grading practices. It appears that a definitive answer to this question awaits a data set in which uniform course content examination scores are available across curriculum tracks. (A regular program of such examinations is being implemented in Dallas as a consequence of the Texas Educational Reform Act of 1984.)

Incidentally, it might be argued that our effects are biased downward by measurement error in the independent variables. However, Alexander and Cook's regressions would then suffer from a similar difficulty. In any event, the reliabilities of the homework time and misbehavior index variables are quite high (see Hotchkiss, 1984).

Finally, Table 4 reports standardized scores (beta weights) for the coefficients of Table 3. These permit a test of the relative magnitude of effects across variables. Reading across

the rows there is some tendency for homework effects to be weakest and course difficulty effects strongest, but differences are not large. Once again we are struck by the overall homogeneity of effects, and the fact that course difficulty may be as important as hours studying in determining the shape of students' careers.

SUMMARY AND DISCUSSION

We have offered a framework which integrates the perspectives of sociologists and economists concerned with schooling; student achievement results from effort (hours and intensity) applied, coursework (in particular, course difficulty) undertaken, and student ability. The first two of these respond in the short run to incentives such as course grades, and this incentive system may differ across the school social worlds into which students are segregated. These are defined by race, SES, and curriculum track, and we have asked whether incentives for effort are weaker for youths in the lower status categories of each of these dichotomies.

The model was tested with data on a large national sample of youths interviewed when they were high school sophomores and seniors; fixed effects (first-differences) estimation permitted unbiased estimates of homework time, misbehavior, and course difficulty effects on grades, while removing the effects of correlated, slowly changing, and unmeasured varibles such as

ability. This technique is the methodology of choice where selection or omitted variable bias is a major threat (Bassi, 1973; Jasso, 1975; Liker et al., 1975).

The results are consistent and statistically significant; for all student subgroups, greater time spent on homework increases grade point averages, misbehavior decreases grade point averages, and siigning up for more difficult courses decreases grade point averages. However, only the effects of the latter variable differed systematically across student groupings, and these showed more strongly negative effects for academic track and white students. This is attributed to the greater demand such students exhibit for these courses, at least partly as a transcript "credential" for college admissions, and the relative scarcity of the resources available to provide them. Consequently, teachers are able to grade more rigorously where such courses are potentially in "excess demand."

Yet the most striking finding is the low absolute magnitude of these incentive-for-effort effects; thus, they account for almost none of the grade point average differences across groups. We must conclude either that ability and unmeasured motivation do account for these differences, or that they are ascriptive, a discriminatory feature of the tracking and stratification system. Despite the findings of Alexander and Cook (1982) in support of the former hypothesis, we believe that this question still bears further examination.

As we enter a period of educational reform, what do our findings say about the incentive system for student effort which

is currently in place? The first thing is that it is functioning; current grading practices do reward time spent on homework and punish misbehavior. However, they also extract a penalty for undertaking more difficult courses, and while necessary and perhaps even desirable, this feature reminds us that incentives often cut two ways and may lead to unanticipated or undesired outcomes. For example, more rigorous grading practices will likely lead to greater student reluctance to undertake difficult coursework, as well as to increased school dropout rates. However, our estimates suggest that these effects are likely to be small in magnitude.

Which raises the second implication of our findings. The relatively low magnitude of our estimated incentive effects suggests that there is a good deal of leeway should reformers desire to strengthen the incentives for schooling effort currently in effect. For example, a low SES, minority student in the non-academic track who increases his homework hours by 10 percent (from 3.14 hours/week to 3.45 hours/week) can expect his grade point average to increase by .00198, or less than 1/10 of a percent of 2.45, the typical grade point average within this group. Surely it would be desirable to provide a stronger incentive for effort in this and related areas.

TABLE 1

DISTRIBUTION OF THE SAMPLE
BY SES, MINORITY STATUS
AND CURRICULUM TRACK

Variable	Percent in Academic Track	N
Low SES, Minority	26.6	4,270
Low SES, White	25.0	6,319
High SES, Minority	39.4	1,848
High SES, White	46.9	9,899
TOTAL	36.2	22,336

TABLE 2

MEANS

Variable	Grades1	ΔGrades	HW1	ΔHW	Misbehav1	ΔMisbehav	Course Difficulty	N
Low SES Minority								
Non Acad	2.45	.132	3.14	.518	.342	.226	2.93	3134
Academic	2.78	.0759	4.50	.476	-.685	.517	4.19	1136
Low SES White								
Non Acad	2.50	.154	3.13	.157	-.064	.506	2.78	4737
Academic	3.07	.0807	5.04	.110	-1.48	.819	4.80	1582
High SES Minority								
Non Acad	2.50	.0917	3.80	.546	.427	.357	3.31	1120
Academic	2.88	.0685	5.70	.306	-.878	.673	4.91	728
High SES White								
Non Acad	2.70	.111	3.64	.164	-.292	.781	3.57	5259
Academic	3.19	.0549	5.81	.424	-1.44	1.02	5.61	4640

TABLE 3

REGRESSION ANALYSIS OF ΔGRADES

Variable	Constant	ΔHW	ΔMisbehavior	Course Difficulty
Low SES Minority Non Academic	.157 (9.0)	.00632 (2.2)	-.0139 (6.7)	-.00880 (1.7)
Academic	.129 (4.0)	.00738 (2.0)	-.00632 (1.7)	-.0128 (1.9)
Low SES White Non Academic	.229 (19.3)	.00496 (2.2)	-.00781 (5.1)	-.0258 (7.4)
Academic	.223 (8.3)	.00864 (3.0)	-.0172 (5.0)	-.0268 (5.2)
High SES Minority Non Academic	.146 (5.0)	.00724 (1.7)	-.0176 (5.3)	-.0158 (2.1)
Academic	.153 (3.6)	.00304 (0.8)	-.00817 (1.8)	-.0162 (2.0)
High SES White Non Academic	.191 (15.7)	.00330 (1.7)	-.0127 (8.0)	-.0198 (6.8)
Academic	.190 (10.4)	.00483 (3.4)	-.0119 (6.0)	-.0223 (7.2)

Note: (Unstandardized Coefficients, Absolute t-scores in parentheses)

TABLE 4

STANDARDIZED REGRESSION COEFFICIENTS

Variable	ΔHW	ΔMisbehavior	Course Difficulty
Low SES, Minority			
Non Academic	.0384	-.0310	-.119
Academic	.0600	-.0494	-.0549
Low SES, White			
Non Academic	.0315	-.074	-.107
Academic	.0753	-.123	-.130
High SES, Minority			
Non Academic	.0508	-.157	-.0622
Academic	.0290	-.0658	-.0736
High SES, White			
Non Academic	.0235	-.109	-.0936
Academic	.0495	-.0876	-.106

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